ROY F. WESTON, INC.

QUALITY ASSURANCE PROJECT PLAN
AMENDMENT NO. 3 (REVISION 3) – GROUNDWATER
VERTICAL SAMPLING ACTIVITIES
EVERGREEN MANOR
ROSCOE, ILLINOIS

WORK ASSIGNMENT NO. 139-RICO-05MZ

REVISION 3 – 30 OCTOBER 2002

WESTON
MANAGERS DESIGNERS CONSULTANTS

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Prepared for:

U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

This document was prepared in accordance with U.S. EPA Contract No. 68-W7-0026, WESTON Region V Response Action Contract

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30 October 2002

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77 West Jackson Boulevard
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U.S. EPA Contract No.: 68-W7-0026
Work Assignment No.: 139-RICO-05MZ
Document Control No.: RFW139-ALXE
Subject: QAPP and FSP Amendment No. 3, Revision 3

Dear Ms. Cibulskis:

Weston Solutions, Inc. (WESTON®) is pleased to submit QAPP Amendment No. 3 (Revision 3) to the Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) dated April 2000 {Document Control No: RFW036-2E-AFGO} and all associated versions that were revised subsequently. This QAPP Amendment relates to the planned sampling and vertical profiling of one deep municipal well at the Evergreen Manor Site.

Should you have any questions or require additional information, please feel free to contact me at (847) 918-4005.

Very truly yours,

ROY F. WESTON, INC.

Deepak L. Bhojwani
Site Manager

DLB:ld
Enclosures
cc: James M. Burton, P.E. (WESTON)

QUALITY ASSURANCE PROJECT PLAN
AMENDMENT NO. 3, REVISION 3
EVERGREEN MANOR
ROSCOE, ILLINOIS

30 October 2002

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QUALITY ASSURANCE PROJECT PLAN

2.1 FACILITY LOCATION AND HISTORY/BACKGROUND INFORMATION

Tetrachloroethylene (PCE) has been intermittently and inconsistently detected above the maximum contaminant limit (MCL) of 5 ug/L in 2 deep public water supply wells located 1/4 mile east of the Evergreen Manor site on the northwest corner of Hononegah and Cedarbrook roads in Roscoe, Illinois. In January 1985, approximately six months after the deep wells were installed, PCE was detected at concentrations ranging from 55 to 230 ug/L. PCE was detected in the initial samples collected from one of the wells immediately after start-up. Prior to startup, this well had been idle for 3 weeks. In samples collected from this well, an hour after startup, PCE concentrations ranged from non-detect (ND) to 6.9 ug/L. PCE was not detected in the other well which had been running continuously. At the time, the Illinois Environmental Protection Agency (IEPA) believed that PCE was a residual solvent in the well casing coating.

Thirty-two rounds of samples (monthly, quarterly, then semi-annually) were collected from both wells between July 1985 and March 1991. PCE was detected at a concentration of 1 ug/L in one of the wells in December 1987. PCE was not detected in any other samples collected between July 1985 and March 1991. From July 1985 to February 1987 it appears that the wells were run for a minimum of 1 hour prior to sampling. After March 1987, there were no changes in the sampling results [Note: records indicate that the wells were only run for 2 to 5 minutes prior to sampling].

In 1991 the wells were downgraded from active status to emergency standby use only (i.e., used less than 30 days a year). Low levels of PCE (ND to 4.1 ug/L) were detected in 1991, 1992 and 1993. In December 1994, PCE concentrations ranged from 20.6 to 31.2 ug/L. From February 1995 to December 1997, PCE concentrations ranged from ND to 4.5 ug/L. In 1996, the wells were upgraded to active

status, although the exact rates and dates of use are not known. Then, in January 1998, PCE was detected at 27 ug/L. From February 1998 to October 1998 PCE concentrations ranged from ND to 0.8 ug/L. Then, in January 1999 PCE was detected at 48 ug/L.

In March 1999, the wells were downgraded to emergency standby use only. Samples collected in 1999, 2001 and 2002 contained PCE at concentrations as high as 20 and 27 to 28 ug/L. However, in thirteen other sampling rounds between May 1999 and August 2002, the concentrations of PCE were significantly lower or ND.

In April 2002, Weston ran each well for approximately 30 minutes before collecting samples and detected PCE at concentrations of less than 1 ug/L. Time series sampling conducted by IEPA in June 2002 detected PCE at 1.8 ug/L in the initial sample, but was non-detect in the samples collected 1, 2, 3, 4 and 5 hours later. However, in July 2002 North Park ran each well for 1 hour prior to collecting the samples (after the wells had been pumping all weekend to meet peak demand) and detected PCE at 27 ug/L in one well, but only at 0.6 ug/L in the other well. The maximum detected concentration of PCE was 48 ug/L in January 1999. PCE was also detected as high as 27 and 28 ug/L in 1998, 1999, and 2001. Several other samples collected from the wells have been at significantly lower concentrations or non-detect.

The two municipal wells are open borehole wells that are drilled through the upper sand and gravel aquifer into the underlying sandstone and dolomite. The wells were installed in 1984. Boring logs and well construction drawings indicate both wells are cased (12-inch steel) down to approximately 550 feet below ground surface (bgs), and are open boreholes to 780 feet bgs. A well detail is provided in Figure 2-4.

2.4.2 PROJECT OBJECTIVES

PCE contamination has been documented in North Park Water District municipal well Nos. 6 and 6A.

These wells are approximately 54 feet apart from each other and are open borehole from 550 to 780 feet bgs. PCE has been intermittently and inconsistently detected above the MCL from 1984 to 2002. It is not clear if the wells are in the zone of contamination, water from which becomes diluted as the wells continue to pump, or if it is the action of pumping which draws contamination into the wells, or if there is PCE in the well casing that may be leaching into the water supply.

The objective of the planned field work is to characterize the contamination in municipal water supply well No. 6 and to determine the vertical extent and/or profile of contamination.. Well No. 6 was chosen because PCE levels observed in this well have been higher than those observed in well No. 6A. Also, the pump assembly of well No. 6 is 65 feet shallower than well No. 6A, and, as such, will require relatively less time to remove and install. There are separate tasks designed to achieve the aforementioned characterization:

- Remove all pump, piping, and pitless assemblies from municipal supply well No. 6 such that access to the well bore is available for testing activities.

- Conduct borehole logging of well No. 6 and aquifer testing (to be conducted by the U.S. EPA and USGS) using well No. 6A. Borehole logging will include: 1) flow meter logging to identify changes in flow along the length of the well; 2) caliper logging to measure the diameter of the borehole; 3) natural gamma logging to evaluate stratigraphy; 4) acoustic televiewer to identify fractures; and 5) temperature and fluid resistivity logging to identify trends in water quality, and potentially to identify flow.

  Aquifer testing will be conducted in order to determine hydraulic parameters of the aquifer. This will be accomplished by conducting a pump test in municipal well No. 6A. During the 24-hour pump test, WESTON will collect time-series samples from the pumped well

(municipal well No. 6A) and time/depth-series samples of vertical intervals from the observation well (municipal well No. 6). The objective of collecting time-series samples from the pumped well No. 6A is to determine the presence and concentrations of contaminants under pumping conditions. Time-series samples from the pumped well will be collected at approximately 2-hour intervals over a 24-hour period. The exact length of the pump test will be determined by the U.S. EPA and WESTON hydrogeologists based on monitored field data and aquifer response pumping.

The objective of collecting time/depth-series samples from the observation well (municipal well No. 6) is to determine the presence and concentration of contaminants at discrete depths under pumping conditions. Time/depth-series samples would be collected from depths of about 550, 610, 670, 730 and 780 ft-bgs. These depths were selected based on the number of samples EPA could reasonably expect to collect within the time available, with an attempt to collect samples from both the top (550 ft-bgs) and the bottom (780 ft-bgs) of the open borehole, with the other samples spaced more or less evenly in between. The exact depths of the sample locations may be altered to target zones of hydraulic interest identified during the geophysical logging conducted prior to the aquifer test. The time/depth-series samples will be collected from each interval before the start of the aquifer test and approximately 6, 12, 18 and 24 hours into the test. The exact timing of the sample collection may be modified by the need to geophysically log the hole at any given time. It is hoped that under the hydraulic conditions induced by pumping, the flow of water in the observation well with be more or less horizontal, and the water at a specific depth in the water column will be reasonably representative of water quality at that point in the aquifer, as long as the flow system is not altered by excessive pumping at the sampling point.

It is anticipated that analysis of both depth and time integrated water-quality data will provide further insight into the depth of contamination in the aquifer and the mechanisms for contaminant migration into the wells. The presence of consistent VOC concentrations at any given point over time would imply that the plume is present in the aquifer. A decrease in VOC concentrations over time may indicate the mobilization of clean water into the aquifer, implying that vertical flow of contaminated water within the well is affecting water quality. An increase in VOC concentrations over time would indicate that pumping mobilizes the plume to the pumped well.

- Collect samples from within the cased portion of municipal well No. 6. Approximately five samples will be collected from approximately 100 feet depth intervals. This will help determine if there is shallow contamination penetrating through cracks in the casing or contamination due to coatings that may have been applied to the casing during initial construction.

- Collect samples from open borehole of municipal well No. 6 using a dual-packer assembly and a submersible pump at 20 feet depth intervals. This will be accomplished under non-pumping conditions after completion of the pump test and will help determine if there is a deeper zone of contamination or vertical stratification in the bedrock aquifer under static conditions.

- Replace the original pump, piping, and pitless assemblies upon completion of aquifer testing and sampling. Conduct any necessary testing to ensure that the municipal system has been returned to its original operating condition.

All samples will be analyzed for the U.S. EPA Target Compound List (TCL) of VOCs. The VOCs will

be analyzed by the Superfund Low Concentration Method through the Contract Laboratory Program (CLP).

Specific protocols associated with the groundwater sampling activities are presented in the Field Sampling Plan (FSP) section of this QAPP.

2.6 PARAMETERS TO BE TESTED AND FREQUENCY

Table 2-1c (attached) presents the sample matrix, analytical parameters, and sampling frequency associated with the groundwater samples.

2.8 PROJECT SCHEDULE

The field activities are expected to last approximately 17 days, starting 28 October 2002.

3.4 LABORATORY OPERATIONS

Groundwater samples will be analyzed for VOCs utilizing the CLP.

4.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

The project required detection limits were submitted in QAPP Amendment No. 1, Revision 2, dated 26 March 2002, as Table 4-2a.

6.2 FIELD CHAIN-OF-CUSTODY PROCEDURES

WESTON will either complete the standard Organic Traffic Report/Chain of Custody form or complete a COC using the FORMS II Lite Software.

7.1 FIELD INSTRUMENTS/EQUIPMENT

Field instruments to be used during the Evergreen Manor site sampling investigation will include the following:

- A pH meter.
- A thermometer or temperature meter.
- A conductivity meter.
- A turbidity meter.
- A dissolved oxygen meter.
- An ORP meter.
- A water level indicator.
- Other geophysical logging and sampling equipment owned and operated by the U.S. EPA and/or USGS.

8.1 OFF-SITE LABORATORY ANALYTICAL PROCEDURES

All VOC samples will be analyzed by a U.S. EPA CLP laboratory.

10.2.3 Data Reporting

The CLP laboratory, in conjunction with the sample management office (SMO), will provide an electronic data deliverable (EDD)for the groundwater analyses. The EDD will be in an excel format and EQUIS compatible. WESTON will utilize the laboratory generated EDD to assist in meeting the U.S. EPA Region V EDD required format for submittal on all superfund projects. WESTON will also incorporate field generated data into the EDD deliverable that will be submitted to U.S. EPA with the data summary report.

FIELD SAMPLING PLAN

SECTION 2 - SAMPLE NETWORK DESIGN AND RATIONALE

Table 2-1c presents a summary of the additional sampling effort for the Evergreen Manor site.

2.3.7 Geophysical Logging and Pump Test

U.S. EPA in conjunction with the USGS will conduct geophysical logging of municipal well No. 6. Geophysical logging would include: 1) flow meter logging to identify changes in flow along the length of the well; 2) caliper logging to measure the diameter of the borehole; 3) natural gamma logging to evaluate stratigraphy; 4) acoustic televiewer to identify fractures; and 5) temperature and fluid resistivity logging to identify trends in water quality, and potentially to identify flow. Subsequent to geophysical logging, a pump test using municipal well No. 6A would be conducted to determine the hydraulic parameters of the aquifer. These tasks will be conducted to help determine if there are cracks in the casing, determine flow characteristics within the borehole, and evaluate contaminant movement through the aquifer. The pump test is proposed to be a 24-hour pump test. The exact test length will be determined by U.S. EPA and WESTON hydrogeologists based on monitored field data and aquifer response to pumping.

Time-Series Sampling

During the 24-hour pump test, WESTON will collect time-series samples from the pumped well (municipal well No. 6A) and time/depth-series from the observation well (municipal well No. 6). The objective of collecting time-series samples from the pumped well is to determine the presence and concentrations of contaminants under pumping conditions. Time-series samples from the pumped well will be collected at approximately 2-hour intervals over a 24-hour period. The exact length of the pump test will be determined

by the U.S. EPA and WESTON hydrogeologists based on monitored field data and aquifer response pumping. A flow through cell water quality meter will also be hooked up to the discharge line to allow for monitoring typical water quality parameters to evaluate water chemistry and environmental processes within the aquifer. Readings will be collected at pre-determined intervals (approximately hourly). Monitored parameters will include pH, specific conductance, temperature, redox-potential, and dissolved oxygen.

Time/Depth-Series Sampling

The objective of collecting time/depth-series samples from the observation well is to determine the presence and concentration of contaminants at discrete times and depths under pumping conditions. Time-series samples from the observation well would be collected from depths of about 550, 610, 670, 730 and 780 ft-bgs. These depths were selected based on the number of samples that U.S. EPA could reasonably expect to collect within the time available, with an attempt to collect samples from both the top (550 ft-bgs) and the bottom (780 ft-bgs) of the open borehole, with the other samples spaced more or less evenly in between. The exact depths of the sample locations may be altered to target zones of hydraulic interest identified during the geophysical logging conducted prior to the aquifer test. The samples will be collected from each interval before the start of the aquifer test and approximately 6, 12, 18 and 24 hours into the test. The exact timing of the sample collection may be modified by the need to geophysically log the hole at any given time.

It is hoped that under the hydraulic conditions induced by pumping, the flow of water in the observation well with be more or less horizontal, and the water at a specific depth in the water column will be reasonably representative of water quality at that point in the aquifer, as long as the flow system is not altered by excessive pumping at the sampling point.

It is anticipated that analysis of both depth and time integrated water-quality data will provide further insight

into the depth of contamination in the aquifer and the mechanisms for contaminant migration into the wells. The presence of consistent VOC concentrations at any given point over time would imply that the plume is present in the aquifer. A decrease in VOC concentrations over time may indicate mobilization of clean water into the aquifer, implying that vertical flow of contaminated water within the well is affecting water quality. An increase in VOC concentrations over time would indicate that pumping mobilizes the plume to the pumped well.

U.S. EPA will conduct Idronaut logging to collect continuous measurements of temperature, dissolved oxygen, specific electrical conductance, ammonium, chloride, and nitrates along the length of the open borehole each time the vertical profile samples are collected, and will run the flow meter down the borehole at the start of the pump test, halfway through the pump test, and at the end of the test before the test is stopped.

All samples will analyzed for VOCs. Appropriate QA/QC samples will also be collected.

2.3.8 Municipal Well Casing Sampling

Upon completion of the U.S. EPA and USGS geophysical logging and pump testing, groundwater samples will be collected from discrete depth intervals within the cased portion of municipal well No. 6. Samples will be collected to evaluate whether the 12-inch cased portion of the well bore is contributing to the contamination. There is projected to be a 2 to 4 day delay between the geophysical logging/pump test and the start of casing sampling to allow for aquifer recovery. Five to seven samples are projected to be collected at sample depths between 50 and 550 feet bgs. Exact sample locations may vary based on the results of the geophysical logging and information gathered about the zones that show the greatest flow. All collected samples will be analyzed for VOCs.

2.3.9 Open Borehole Sampling

The aquifer will be sampled at various depths to determine if contamination is present below the bottom of the cased portion of municipal Well No. 6. A high pressure dual-packer straddle system, capable of effectively sealing off the formation above and below the packers, will be used to collect all samples. The dual-packer system will allow for a 20-foot interval to be packed off, purged, and sampled. Under ideal conditions, the aquifer packer sampling will be conducted every 20 feet from the bottom of the cased portion of the well to the bottom of the well. Exact sample locations may vary based on the results of the geophysical logging and information gathered about the zones that show the greatest flow. Eleven samples are projected to be collected. All samples will be analyzed for VOCs.

2.6 WASTE DISPOSAL

Investigative derived waste, such as purge water, generated during the investigation will be disposed of on the ground surface. Based on sampling during the April 2002 field investigation, the water is not contaminated above the MCLs.

The North Park Water District is currently looking into where the water generated during the pump test will be discharged. The pump test is anticipated to generate 480 gpm. The discharge location will be determined prior to the start of the pump test.

3.3.7 Geophysical Logging and Pump Test

U.S. EPA in conjunction with the USGS will conduct geophysical logging of municipal well No. 6 and a pump test using municipal well No. 6A. The exact length of the pump test will be determined by the U.S. EPA and WESTON hydrogeologists based on monitored field data and aquifer response to pumping, but

is expected to last 24 hours. These tasks are being internally coordinated by the U.S. EPA. During the 24-hour pump test, WESTON will collect time-series samples from the pumped well (municipal well No. 6A) and time/depth-series samples from the observation well (municipal well No. 6).

Time-Series Sampling

Time-series samples will be collected from the pumped well (well No. 6A) at the beginning of the pump test and at approximately 2-hour intervals, thereafter, over a 24-hour period. Samples will be collected from a sampling port located inside the nearby pump house into appropriate laboratory sample containers. A flow through cell water quality meter will also be hooked up to the discharge line to allow for monitoring typical water quality parameters to evaluate water chemistry and environmental processes within the aquifer. Readings will be collected at pre-determined intervals (approximately hourly). Monitored parameters will include pH, specific conductance, temperature, redox-potential, and dissolved oxygen.

To avoid splashing and minimize any potential volatilization during time-series VOC sampling, the sample port will be opened slowly to allow the lowest achievable, steady stream of water to exit the port. A new, laboratory supplied, pre-preserved with hydrochloric acid (HCl), 40-ml VOA sample vials will be filled at a 45 degree angle until full, then capped such that no headspace (i.e., no bubbles) are present. If bubbles persist, an unpreserved VOC sample will be collected (the Field Sample Manager will note the absence of the preservative on the sample paperwork and in the field logbook). The sample container, volume and preservation requirements are presented in Table 7-1. The sample bottle will be handled in a manner that will minimize the contact of foreign objects with the inside of the sampling container. To ensure adequate preservatives are present and not removed or diluted, the vials will not be overfilled, rinsed, or emptied during sampling. Flow will not be adjusted during sampling in order to avoid dislodging any particles in the sample port.

Time/Depth-Series Sampling

Time/depth-series samples from the observation well (Well No. 6) will be collected from depths of about 550, 610, 670, 730 and 780 ft-bgs during the 24-hour pump test. These depths were selected based on the number of samples that U.S. EPA could reasonably expect to collect within the time available, with an attempt to collect samples from both the top (550 ft-bgs) and the bottom (780 ft-bgs) of the open borehole, with the other samples spaced more or less evenly in between. The exact depths of the sample locations may be altered to target zones of hydraulic interest identified during the geophysical logging conducted prior to the aquifer test. Samples from each of the above depths will be collected during five time periods as follows:

- Before the start of the aquifer test;
- 6 hours after test initiation;
- 12 hours after test initiation;
- 18 hours after test initiation; and
- 24 hours after test initiation (just prior to pump shutdown and recovery monitoring).

The exact timing of the sample collection may be modified by the need to geophysically log the hole at any given time.

Idronaut logging during time/depth-series sampling of the observation well (Well No. 6) will be conducted by the U.S. EPA to collect continuous measurements of temperature, dissolved oxygen, specific electrical conductance, ammonium, chloride, and nitrates along the length of the open borehole each time the vertical profile samples are collected. In addition, the U.S. EPA will run the flow meter down the borehole at the

start of the pump test, halfway through the pump test, and at the end of the test before the test is stopped.

Samples from the observation well (Well No. 6) will be collected using a bomb-type fluid sampler suspended from a wire-line winch assembly. The bomb-type fluid sampler has a 500-ml flask with a valve that is opened when the discreet depth interval is reached, thereby flooding the flask. The sampler will be retrieved and a groundwater sample collected through a bottom-discharge valve into the appropriate laboratory sample containers. Following decontamination, the sampler will be lowered to the next desired depth interval and the procedure repeated.

The bomb-type fluid sampler is being proposed instead of a positive displacement pump primarily due to its compatibility with U.S. EPA's geophysical testing equipment, wire-line winch assembly, and ease of use at greater depths. The bomb-type fluid sampler readily attaches to the geophysical equipment that will be used by the U.S. EPA and is easy to lower and raise in concert with Idronaut logging equipment, thereby, eliminating the need for multiple runs. Given the sampling depths and pump weight, a truck-mounted power winch (separate from U.S. EPAs geophysical equipment) would be required to raise and lower a positive displacement pump. In addition, the procurement and field-management (including labor, decontamination, etc.) of approximately 800 to 1000 feet of continuous tubing between sampling events makes the positive displacement pump an impractical and cost-prohibitive alternative in this specific application.

To avoid splashing and minimize any potential volatilization during time/depth-series VOC sampling, the sample port on the 500-ml flask will be opened slowly to allow the lowest achievable, steady stream of water to exit the port. A new, laboratory supplied, pre-preserved with hydrochloric acid (HCl), 40-ml VOA sample vials will be filled at a 45 degree angle until full, then capped such that no headspace (i.e., no bubbles) are present. If bubbles persist, an unpreserved VOC sample will be collected (the Field Sample Manager will note the absence of the preservative on the sample paperwork and in the field logbook). The

sample container, volume and preservation requirements are presented in Table 7-1. The sample bottle will be handled in a manner that will minimize the contact of foreign objects with the inside of the sampling container. To ensure adequate preservatives are present and not removed or diluted, the vials will not be overfilled, rinsed, or emptied during sampling. Flow will not be adjusted during sampling in order to avoid dislodging any particles in the sample port.

The time of sample collection will be recorded. Any deviation from standard sampling practice will also be recorded. The name(s) of the occupant, the occupant's exact mailing address, and the occupant's telephone number will be entered into the field sampling logbook.

U.S. EPA will supply and operate all downhole sampling and parameter measurement equipment (e.g., fluid sampler, winch, wireline, Idronaut, logging equipment, etc.) employed during this task. WESTON personnel will aid U.S. EPA personnel, as needed, in deploying the downhole sampling and measurement equipment and will be responsible for collecting, labeling, tracking, and shipping groundwater samples along with completing all necessary paperwork (e.g., chain-of-custody, etc.). WESTON will also provide all necessary laboratory sample containers, preservatives, coolers, and packing materials.

3.3.8 Municipal Well Casing Sampling

Samples from the cased portion of municipal Well No. 6 will be collected using a positive displacement, submersible pump at a low flow rate (up to 1 gpm). The pump will only operate long enough to displace a volume of approximately three times any water in the pipe/tubing assembly with sampling occurring immediately after. No water quality parameters will be collected during this sampling since this would require additional purging and would result in potential mixing zones within the well casing.

The static water level in the municipal well is approximately 50 feet bgs. The uppermost sample will be collected from just below the static water level. Subsequent water samples will be collected at approximately 100 foot intervals thereafter. For the purposes of this document, it is assumed that the samples will be collected at approximately 50, 150, 250, 350, and 450 feet bgs. Up to two additional samples may be collected at discrete depths. Exact sample locations may vary based on the results of the geophysical logging and information gathered about the zones that show the greatest flow.

3.3.9 Open Borehole Sampling

Purging and sampling in the open borehole of municipal Well No. 6 will be performed using a positive displacement submersible pump located between the packers, or within the drop pipe above the packed off interval. Sampling will occur every 20 feet from the bottom of the cased portion of the well bore to the bottom of the well. Exact sample locations may vary based on the results of the geophysical logging and information gathered about the zones that show the greatest flow. A minimum of five "packer interval" volumes will be purged from the packed off interval prior to sampling. The "packer" volume will consist of the volume located between the packers, and any water located in the riser pipe. Purging will occur at a higher pumping rate. Following the fifth purge volume, the flow rate will be adjusted back to about 1 gpm and field monitoring for parameter stabilization will begin. Parameters monitored will include: pH, conductivity, temperature, redox potential, DO, and turbidity. Stabilization will be considered achieved when three consecutive readings of the following parameters, within the following tolerances, have been measured:

- pH +/- 0.1 standard pH units.
- Conductivity +/- 3 %
- Temperature +/- 10° C
- Redox potential +/- 10 mV

- Turbidity — 10% for values greater than 5 NTU; or any reading below 5 NTU.
- Dissolved oxygen — 10%

Following stabilization, samples will be collected. All samples will be analyzed for VOCs.

To avoid splashing and minimize any potential volatilization during open borehole packer VOC sampling, the pump will be throttled back slowly to allow the lowest achievable, steady stream of water to exit the port. A new, laboratory supplied, pre-preserved with hydrochloric acid (HCl), 40-ml VOA sample vials will be filled at a 45 degree angle until full, then capped such that no headspace (i.e., no bubbles) are present. If bubbles persist, an unpreserved VOC sample will be collected (the Field Sample Manager will note the absence of the preservative on the sample paperwork and in the field logbook). The sample container, volume and preservation requirements are presented in Table 7-1. The sample bottle will be handled in a manner that will minimize the contact of foreign objects with the inside of the sampling container. To ensure adequate preservatives are present and not removed or diluted, the vials will not be overfilled, rinsed, or emptied during sampling. Flow will not be adjusted during sampling in order to avoid dislodging any particles in the sample port.

The time of sample collection will be recorded. Any deviation from standard sampling practice will also be recorded. The name(s) of the occupant, the occupant's exact mailing address, and the occupant's telephone number will be entered into the field sampling logbook.

To evaluate potentiometric head levels from various depths and the effectiveness of the packer seals against the borehole wall, water levels will be measured as follows:

- Water level from open borehole prior to packer apparatus insertion at start of testing.

- Water level from within the packer apparatus drop pipe and outside the apparatus drop pipe prior to packer inflation.

- Water level from within the packer apparatus drop pipe and outside the apparatus drop pipe after packer inflation, during test interval purging, and at completion of sampling prior to pump shut off.

5.1 PROJECT SAMPLE NUMBERING SYSTEM

Some examples of the WESTON project numbering system for the groundwater sampling is as follows:

- EM3-NPW6-50: Evergreen Manor site, phase 3, sample from municipal well No. 6, collected at 50 feet bgs.

- EM3-NPW6-580-600: Evergreen Manor site, phase 3, sample from municipal well No. 6, collected between 580 and 600 feet bgs.

- EM3-NPW6-580-600DP: Evergreen Manor site, phase 3, sample from municipal well No. 6 collected between 580 and 600 feet bgs, field duplicate sample.

- EM3-NPW6-FB01: Evergreen Manor site, phase 3, sample from municipal well No. 6 first field blank sample.

- EM3-NPW6-TB03: Evergreen Manor site, phase 3, sample from municipal well No. 6, third trip blank sample.

- EM3-NPW6A-PT0800: Evergreen Manor site, phase 3, time-series sample collected from municipal well No. 6A during the pump test at 0800 hours into the pump test.

- EM3-NPW6-550-PT0800: Evergreen Manor site, phase 3, sample from municipal well No. 6, collected at a depth of 550 bgs at 0800 hours into the pump test

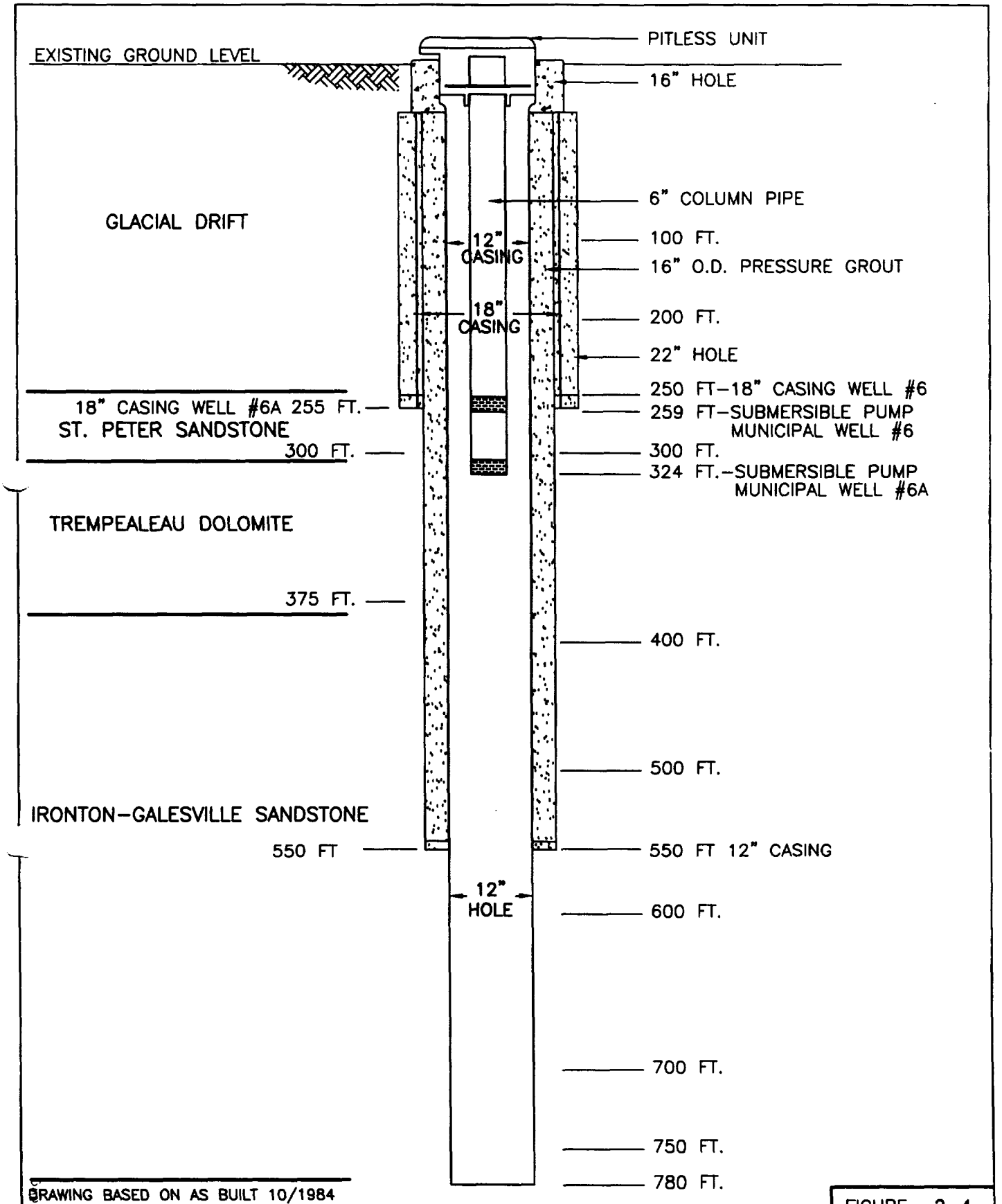
6.3 SAMPLE DOCUMENTATION FORMS

Combination COC/TR or Forms II Lite software will be used for all samples.

7.1 SAMPLE CONTAINERS AND SAMPLE PRESERVATION

Table 7-1c lists the required sample containers, sample volumes, sample preservation requirements, and holding times associated with the groundwater analysis.

FIGURES



DRAWING BASED ON AS BUILT 10/1984
FEHR, GRAHAM, AND ASSOCIATES

FIGURE 2–4

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68–W7–0026
WORK ASSIGNMENT No. 139–RICO–05MZ
DOCUMENT CONTROL No. RFW139–2E–ALDK

WELL DETAIL
EVERGREEN MANOR
Roscoe, Illinois

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TABLES

Table 2-1c

Summary of Sampling and Analysis Program for Evergreen Manor Roscoe, Illinois

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative			Field Duplicate			Equipment Blank			MS/MSD[1]			Matrix Total*
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Groundwater samples - casing	None	CLP Low Conc. Volatile Organics	7	1	7	1	1	1	1	1	1	1	1	1	9
Groundwater samples - open borehole	pH, temperature, conductivity, DO, redox potential, turbidity (WESTON).	CLP Low Conc. Volatile Organics	11	1	11	2	1	1	2	1	2	1	1	1	15
Groundwater samples - time-series pump test	pH, specific conductance, temperature, redox-potential, and dissolved oxygen (WESTON).	CLP Low Conc. Volatile Organics	12	1	12	2	1	2	-	-	-	1	1	1	14
Groundwater samples - time/depth-series samples from observation well during pump test.	Temperature, dissolved oxygen, specific electrical conductance, ammonium, chloride, and nitrates via Idronaut logging (U. S. EPA)	CLP Low Conc. Volatile Organics	25	1	25	3	1	3	3	1	3	2	1	2	31

Note: An MS/MSD does not count in the matrix total. MS/MSD's may be combined. MS/MSD will be collected at a minimum frequency of one per every 20 samples. Trip blanks will be included in each cooler shipped.

Table 7-1c

Sample Container, Volume, and Preservation Requirements
Evergreen Manor Site
Roscoe, Illinois

Matrix Type	Analysis	Sample Concentration Level	No. of Bottles	Type of Bottles	Preservatives	Technical Holding Time*
Groundwater samples	Volatiles	Low	3	40 milliliter VOA vials	Cool, 4 degrees C. Hydrochloric acid to pH <2	14 days

* All holding times are from the date of sample collection.

Note: MS/MSD samples will require triple the normal volume for volatile organics. One trip blank will accompany each VOA shipment container.